Name: _____

A-Level Maths Induction Revision Material

YOU MUST NOT USE A CALCULATOR for any questions and all working out will be expected to be seen.

Have a go at each question, then check your answer. If incorrect please research the topic until you are confident with it (there are thousands of videos on YouTube to help you).

Please bring your solutions and ALL your working out to your first maths lesson.

This will help you prepare for your initial assessment on Monday 15th September 2025.

This assessment will show us your level of suitability for the course.

INDICES

Simplify:

1) $x^5 \times x^{-2}$

2) $\frac{w^5}{w^{-3}}$

3) $\frac{3}{(3a)^2}$

4) $(mn^2)^5$

5) $2y^2 \times 3y^{\frac{1}{2}}$

6) $12x^4 \div 3x^{-2}$

7) $y^2(y^3 - y^{-\frac{1}{2}})$

8) $\frac{w^2 \times w^{-3}}{w^{-4}}$

Write in index form:

1) $\sqrt{b}$

2) $\frac{1}{g}$

3) $\sqrt{p^3}$

4) $\sqrt[3]{k^2}$

5) $\frac{1}{\sqrt{c}}$

6) $\frac{6}{x^3}$

LINEAR EQUATIONS

Solve the following:

1) $5 - \frac{x}{9} = -1$

2) $2(3x - 1) + 3 = 21$

3) $3x - 2(6x - 3) = 42$

4) $2x - 8 = 6x + 4$

FACTORISING

Factorise the following:

1. $4x^2 - 9$
2. $x^2 + 8x + 15$
3. $6x^2 - x - 1$
4. $1 - x^2$
5. $15a^2b + 9ab^2$
6. $x^2y^2 - 2xy + 1$
7. $2x^2 - 6xy$
8. $9x^2 - 6x + 1$
9. $3 + 2x - x^2$
10. $25x^2 - 16$
11. $9x^2 + 30x + 25$
12. $6x^2 + 11xy + 4y^2$
13. $7x^2 - 5x - 150$

SURDS

Simplify:

1) $\sqrt{96}$

2) $\sqrt{90} + \sqrt{250}$

3) $\sqrt{250} - \sqrt{160}$

4) $\sqrt{2} \times \sqrt{14}$

5) $\sqrt{50} \div \sqrt{10}$

6) $(2 + \sqrt{10})^2$

7) $(4 - \sqrt{5})^2$

Rationalise the denominator:

1) $\frac{5}{\sqrt{10}}$

2) $\frac{2}{(1-\sqrt{3})}$

3) $\frac{1-\sqrt{5}}{(2+\sqrt{5})}$

COMPLETING THE SQUARE

Write the following in completed square form:

1) $x^2 - 2x + 8$

2) $x^2 + 7x - 2$

3) $2x^2 + 4x - 1$

4) $3x^2 - 2x + 6$

SOLVING QUADRATICS

Solve by factorising:

1) $f^2 - 5f = 0$

2) $p^2 + 8p + 16 = 0$

3) $b^2 - 9 = 0$

4) $2x^2 - x - 3 = 0$

Solve by completing the square (leave your answer in simplified surd form):

1) $c^2 + 4c = 0$

2) $z^2 - 10z - 35 = 0$

3) $2y^2 + 12y - 10 = 0$

Solve using the quadratic formula (leave your answer in simplified surd form):

1) $x^2 + 5x + 2 = 0$

2) $2x^2 - 6x - 18 = 0$

SIMULATEOUS EQUATIONS

Solve the pair of simultaneous equations:

1)

$$5a + 3b = 9$$
$$2a - 3b = 12$$

2) 4 apples and 1 banana cost £1.70. 2 apples and 1 banana cost 90p. Work out how much one apple costs and how much one banana costs each?

3)

$$3x + 7y = 26$$
$$4x + 5y = 13$$

4)

$$x^2 + y^2 = 25$$
$$y = x - 7$$

5)

$$x^2 - 2x - 25 = y$$
$$y = x - 7$$

ALGEBRAIC FRACTIONS

Simplify:

1) $\frac{u^2-7u+12}{u-3}$

2) $\frac{y^2-16}{y^2+4y}$

3) $\frac{4}{v}+\frac{3}{v+1}$

4) $\frac{2}{2f-1}-\frac{5}{2f+1}$

5) $\frac{s+1}{s+2}-\frac{s-4}{s-3}$

6) $\frac{9}{n^2-4n+3}\times\frac{n-3}{2}$

7) $\frac{7}{d-2}\div\frac{8}{d^2-d-2}$

8) $\frac{4r}{r-2}\times\frac{r^2+2r-8}{7}$

STRAIGHT LINES

Work out the following:

1) A line segment is drawn between $(4,8)$ and $(8,5)$. Find its gradient.

2) A line segment is drawn between $(2,8)$ and $(-6,2)$. Find its midpoint.

3) A line segment is drawn between $(0,-5)$ and $(12,1)$. Find its length (leave your answer as a simplified surd).

Find the gradient of the following straight lines:

1) $y = 3x + 9$

2) $4y = -3x - 2$

3) $y + 3x = 7$

4) $6x - 2y + 17 = 0$

CIRCLES

Work out the following:

1) The centre and radius of the circle with equation $x^2 + y^2 = 25$

2) The equation of the circle with centre $(0,0)$ and radius 4.

3) The equation of the circle with centre $(0,0)$ and radius $\sqrt{2}$.

Answers

INDICES

1) x^3

2) w^8

3) $\frac{1}{3a^2}$

4) m^5n^{10}

5) $6y^{\frac{5}{2}}$

6) $4x^6$

7) $y^5 - y^{\frac{3}{2}}$

8) w^3

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1) $b^{\frac{1}{2}}$

2) g^{-1}

3) $p^{\frac{3}{2}}$

4) $k^{\frac{2}{3}}$

5) $c^{-\frac{1}{2}}$

6) $6x^{-3}$

LINEAR EQUATIONS

1) $x = 54$
2) $x = \frac{10}{3}$
3) $x = -4$
4) $x = -3$

FACTORISING

1) $(2x + 3)(2x - 3)$
2) $(x + 5)(x + 3)$
3) $(3x + 1)(2x - 1)$
4) $(1 + x)(1 - x)$
5) $3ab(5a + 3b)$
6) $(xy - 1)(xy - 1) = (xy - 1)^2$
7) $2x(x - 3y)$
8) $(3x - 1)(3x - 1) = (3x - 1)^2$
9) $(3 - x)(1 + x)$
10) $(5x - 4)(5x + 4)$
11) $(3x + 5)(3x + 5) = (3x + 5)^2$
12) $(3x + 4y)(2x + y)$
13) $(7x + 30)(x - 5)$

SURDS

1) $4\sqrt{6}$
2) $8\sqrt{10}$
3) $\sqrt{10}$
4) $2\sqrt{7}$
5) $\sqrt{5}$
6) $14 + 4\sqrt{10}$
7) $21 - 8\sqrt{5}$

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1) $\frac{\sqrt{10}}{2}$

2) $-1 - \sqrt{3}$

3) $-7 + 3\sqrt{5}$

COMPLETING THE SQUARE

1) $(x-1)^2 + 7$

2) $(x + \frac{7}{2})^2 - \frac{57}{4}$

3) $2(x+1)^2 - 3$

4) $3(x - \frac{1}{3})^2 + \frac{17}{3}$

SOLVING QUADRATICS

1) $f = 0, f = 5$
2) $p = -4$
3) $b = 3, b = -3$
4) $x = \frac{3}{2}, x = -1$

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1) $c = 0, c = -4$
2) $z = 5 + 2\sqrt{15}, z = 5 - 2\sqrt{15}$
3) $y = -3 + \sqrt{14}, z = -3 - \sqrt{14}$

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1) $x = \frac{-5+\sqrt{17}}{2}, x = \frac{-5-\sqrt{17}}{2}$

2) $x = \frac{3+3\sqrt{5}}{2}, x = \frac{3-3\sqrt{5}}{2}$

SIMULATEOUS EQUATIONS

1) $a = 3, b = -2$
2) $apple = 40p, banana = 10p$
3) $y = 5, x = -3$
4) $x = 4, y = -3$ *and* $x = 3, y = -4$
5) $x = 6, y = -1$ *and* $x = -3, y = -10$

ALGEBRAIC FRACTIONS

1) $u - 4$

2) $\frac{y-4}{y}$

3) $\frac{7v+4}{v(v+1)}$

4) $\frac{7-6f}{(2f-1)(2f+1)}$

5) $\frac{5}{(s+2)(s-3)}$

6) $\frac{9}{2(n-1)}$

7) $\frac{7(d+1)}{8}$

8) $\frac{4r(r+4)}{7}$

STRAIGHT LINES

1) $\frac{-3}{4}$

2) $(-2, 5)$

3) $6\sqrt{5}$

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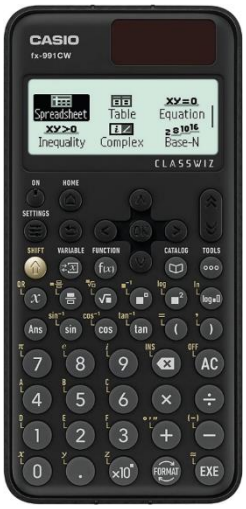
1) 3
2) $-\frac{3}{4}$
3) -3
4) 3

CIRCLES

1) $(0,0)\ r = 5$
2) $x^2 + y^2 = 16$
3) $x^2 + y^2 = 2$

Transition from GCSE Maths to A-level Maths

Calculator:



The calculator you will need for you A-level maths is **CASIO fx-991CW**

This is different to the GCSE version and has extra functions that you need in A-level maths, particularly the statistics element of the course, so it is essential that you get his model of the calculator for you A-level studies

Websites:

Below are some links to websites with extra resources to help you prepare for your transition from GCSE to A-level Maths:

A level Maths Revision:
https://alevelmathsrevision.com/bridging-the-gap/

Advanced Maths support programme:
https://amsp.org.uk/teachers/11-16-maths/transition-to-level-3-maths/essential-skills/

Pearson: Videos to assist the transition from GCSE to A-level Maths:
https://www.pearson.com/uk/educators/schools/subject-area/mathematics/unrivalled-support/support-from-pearson/gcse-maths-transition-to-alevel.html

Sparx Maths:
https://sparxmaths.com/resources/transition-booklet-alevel